WHAT IS CLAIMED IS:

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1. A DNA inspecting method of irradiating a to-be-inspected DNA chip with excitation lights having a desired wavelength and of analyzing obtained fluorescent lights, said to-be-inspected DNA chip obtained by hybridizing a target with a DNA chip, said target obtained by adding a desired fluorescent material to a DNA fragment formed by a preprocessing from a DNA that is a detection target, said DNA chip including a plurality of L cells that are microscopic areas where a plurality of types of desired fragments are arranged in accordance with a predetermined regular rule, comprising the steps of:

irradiating mutually different positions with said plurality of M multi-spot excitation lights simultaneously with the use of an objective lens for a time Δt that is longer than a fluorescent light attenuation time, said multi-spot excitation lights having a spot diameter d that is smaller than a dimension D of said each cell,

guiding said obtained fluorescent lights to a fluorescent light detecting optical path,

separating and detecting said fluorescent lights from respective multi-spot lights generated by said multi-spot excitation lights onto said DNA chip, and

executing an inspection of said to-be-inspected DNA chip from positions and intensities of

said fluorescent lights.

2. The DNA inspecting method as claimed in Claim 1, wherein said plurality of M excitation light spots are arranged in a 1-dimensional or 2-dimensional configuration with a fixed pitch on a straight line.

3. The DNA inspecting method as claimed in Claim 1, further comprising the steps of:

arranging said plurality of M irradiation spots onto said DNA chip on a straight line with a spacing of substantially kd with reference to said spot diameter d and an integer k, and

repeating an operation in sequence k times, said operation being an operation where, after said irradiation with said spot array has been performed during said time Δt, said array is displaced in a direction of said array by substantially d and said irradiation is performed again during said time Δt, and thereby

executing said inspection toward kM spot positions in said array direction, and

displacing said DNA chip and said objective lens relatively at least in a direction perpendicular to said array direction, and thereby

inspecting a desired 2-dimensional area on said DNA chip.

4. The DNA inspecting method as claimed in Claim 1, further comprising the step of providing fluorescent light detection deflecting means within said fluo-

rescent light detecting optical path so that said fluorescent lights generated by said excitation lights are synchronized with said displacement of said spot array in said array direction and come onto substantially the same location on said light-receiving apertures.

5. The DNA inspecting method as claimed in Claim 4, wherein said fluorescent light detection deflecting means includes a wavelength selection beam splitter for permitting said excitation lights to pass therethrough and causing said fluorescent lights to be reflected.

6. The DNA inspecting method as claimed in Claim 1, further comprising the step of providing a filter within said fluorescent light detecting optical path isolated from an excitation optical path, said filter permitting only said fluorescent lights to pass therethrough and light-shielding said excitation lights.

7. The DNA inspecting method as claimed in Claim 1, further comprising the step of forming said M multi excitation spot lights by using a plurality of laser light-sources.

8. The DNA inspecting method as claimed in Claim 7, wherein said M multi excitation spot lights are obtained by the steps:

guiding, into optical fibers, said lights emitted from said plurality of laser light-sources, and

causing said lights to be emitted from light-emitting ends of said optical fibers, said light-emitting ends being aligned with M desired pitches.

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9. The DNA inspecting method as claimed in Claim 1, wherein said excitation lights include a plurality of different wavelengths, and further comprising the step of separating different targets so as to detect said different targets, a plurality of fluorescent materials having been added to said different targets.

10. THe DNA inspecting method as claimed in Claim 9, further comprising the steps of:

performing simultaneous irradiation with said excitation lights including said plurality of wavelengths, and thereby

separating said different targets so as to simultaneously detect said different targets, said plurality of fluorescent materials having been added to said different targets.

11. The DNA inspecting method as claimed in Claim 1, further comprising the steps of:

causing a 2nd light to be obliquely launched into a proximity to said excitation spot lights on an inspection plane of said to-be-inspected DNA chip so as to detect a position at which said light is reflected on said inspection plane, thereby executing a focal point detection, said desired fluorescent material-added target being hybridized with said inspection plane, and

controlling a relative distance between said inspection plane and said objective lens in accordance with this information, thereby achieving said focal

point.

12. A DNA inspecting apparatus including an excitation light irradiating system for irradiating a DNA chip with excitation lights from an excitation light light-source and a fluorescent light detecting system for detecting fluorescent lights generated from a fluorescent material on said DNA chip, comprising:

a multi-spot excitation lights-generating optical system for causing said plurality of M excitation lights to be simultaneously generated on said DNA chip, said excitation lights having a spot diameter d that is smaller than a dimension D of a large number of L cells existing on said DNA chip,

an objective lens for causing said fluorescent material to be simultaneously irradiated with said multi-spot lights in said dimension d, said fluorescent material being added to a DNA fragment on said DNA chip,

a beam splitter for guiding said obtained fluorescent lights to a fluorescent light detecting optical path through said objective lens,

fluorescent light detecting means for separating and detecting said fluorescent lights from respective multi-spot lights generated by said multi-spot excitation lights,

driving means for relatively changing positions of said multi-spot lights and a position of said DNA chip so as to detect said fluorescent lights

in such a manner that a desired area on said DNA chip is irradiated with said multi-spot lights, and

a control system for determining and inspecting DNA information about said to-be-inspected DNA chip from fluorescent light intensities and fluorescent light positions of said desired area on said DNA chip, said fluorescent light intensities and said fluorescent light positions being detected by said driving means and said fluorescent light detecting means.

13. The DNA inspecting apparatus as claimed in Claim 12, wherein said multi-spot excitation lights-generating optical system generates said plurality of M excitation light spots simultaneously, said plurality of M excitation light spots being arranged in a 1-dimensional or 2-dimensional manner with a fixed pitch on a straight line.

14. The DNA inspecting apparatus as claimed in Claim 12, wherein said control system arranges said plurality of M irradiation spots onto said DNA chip on a straight line with a spacing of substantially kd with reference to said spot diameter d and an integer k, and repeats an operation in sequence k times, said operation being an operation where, after said irradiation with said spot array has been performed during said time Δt, said array is displaced in a direction of said array by substantially d and said irradiation is performed again during said time Δt, and thereby executes said inspection toward kM spot positions in

said array direction, and displaces said DNA chip and said objective lens relatively at least in a direction perpendicular to said array direction, and thereby inspects said desired 2-dimensional area on said DNA chip.

15. The DNA inspecting apparatus as claimed in Claim 12, wherein said spot array is formed by a microlens array.

16. The DNA inspecting apparatus as claimed in Claim 12, wherein said spot array is formed by a hologram.

17. The DNA inspecting apparatus as claimed in Claim 12, further comprising deflecting means configured so that said fluorescent lights generated by said excitation lights are synchronized with a displacement of said spot array in an array direction and come onto substantially the same location on said light-receiving apertures.

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18. A DNA inspecting method, comprising the steps of:

branching a laser beam so as to form 8 or more beams, said laser beam being emitted from a laser light-source,

irradiating an inspection plane of a DNA chip with said 8 or more beams formed by being branched,

causing fluorescent lights to correspond to said respective beams and separating said fluorescent lights from reflected lights of said beams so as to

detect said fluorescent lights, said fluorescent lights being generated from said DNA chip by said irradiation, said respective beams the irradiation of which having been performed in being branched into 8 or more, and

inspecting said DNA chip in accordance with information on said fluorescent lights detected by being caused to correspond to said respective beams.

19. A DNA inspecting method, comprising the steps of:

branching a laser beam into a plurality of beams having substantially the same intensity, said laser beam being emitted from a laser light-source,

projecting images of said plurality of branched beams onto an inspection plane of a DNA chip,

image-photographing images of fluorescent lights generated from said DNA chip by said projected images of said plurality of beams, and

inspecting said DNA chip in accordance with information on said image-photographed images of said fluorescent lights.

20. The DNA inspecting method as claimed in Claim 19, wherein said DNA chip is inspected by irradiating said DNA chip with said beams while displacing said DNA chip and said beams relatively in a 2-dimensional manner.

21. The DNA inspecting method as claimed in Claim 19, wherein said DNA chip is irradiated with said branched beams located in a 2-dimensional manner.

22. A DNA inspecting method of irradiating a sample with excitation lights so as to detect fluorescent lights, said sample being obtained by coupling a fluorescent molecule-added DNA fragment with a DNA corresponding thereto, comprising the steps of:

separating said fluorescent lights from said excitation lights, said fluorescent lights being emitted from respective multi spots obtained by irradiating said sample with said multi-spot excitation lights including a large number of M microscopic spots,

detecting said fluorescent light images emitted from said sample with the use of a plurality of weak light detecting devices capable of executing a photon counting,

photon-counting, individually, each of photon signals obtained from said respective detecting devices,

storing, individually, photon-counted numbers Npm detected by said respective detecting devices,

changing positions of said multi-spot lights and a position of said sample relatively so as to store in sequence said photon-counted numbers from said respective detectors,

collecting and storing data on said photon-counted numbers over a desired range on said sample, and

constructing a fluorescent light picture from said collected data so as to execute said DNA inspec-

tion.

23. A DNA inspecting method of irradiating a sample with excitation lights so as to detect fluorescent lights, said sample being obtained by coupling a fluorescent molecule-added DNA fragment with a DNA corresponding thereto, comprising the steps of:

separating said fluorescent lights from said excitation lights, said fluorescent lights being emitted from irradiation areas having a long and narrow configuration, said irradiation areas being obtained by irradiating said sample with said sheet-shaped excitation lights,

detecting said fluorescent light images emitted from said sample with the use of a plurality of weak light detecting devices capable of executing a photon counting,

photon-counting, individually, each of photon signals obtained from said respective detecting devices,

storing, individually, photon-counted numbers Npm detected by said respective detecting devices,

changing positions of said irradiation areas and a position of said sample relatively so as to store in sequence said photon-counted numbers from said respective detectors, said irradiation areas resulting from said sheet-shaped excitation lights and having said long and narrow configuration,

collecting and storing data on said photon-

counted numbers over a desired range on said sample, and

constructing a fluorescent light picture from said collected data so as to execute said DNA inspection.

24. The DNA inspecting method as claimed in Claim 22, wherein said M is equal to 10 or more.

25. The DNA inspecting method as claimed in Claim 24, wherein said M is equal to 50 or more.

26. The DNA inspecting method as claimed in Claim 22, wherein said multi spots are arranged on a 1-dimensional or 2-dimensional straight line.

27. The DNA inspecting method as claimed in Claim 22, wherein said multi-spot lights or said sheet-shaped excitation lights are multi-color lights having 2 or more wavelengths.

28. A DNA inspecting method of irradiating a sample with excitation lights so as to detect fluorescent lights, said sample being obtained by coupling a fluorescent molecule-added DNA fragment with a DNA corresponding thereto, comprising the steps of:

separating said fluorescent lights from said excitation lights, said fluorescent lights being emitted from respective multi spots or sheet-shaped irradiation locations that is obtained by irradiating said sample with said multi-spot excitation lights or said sheet-shaped excitation lights, said multi-spot excitation lights including a large number of M micro-

scopic spots,

detecting said fluorescent light images emitted from said sample with the use of a plurality of M weak light detecting devices in an average pixel detecting time of (300 μsec/M) or less,

storing, individually, signals obtained from said respective detecting devices,

changing, relatively, positions of said multi-spot lights or said sheet-shaped excitation lights and a position of said sample so as to store said signals in sequence,

collecting and storing said signals over a desired range on said sample, and

constructing a fluorescent light picture from said collected data so as to inspect said DNA.

29. A DNA inspecting method of irradiating a sample with excitation lights so as to detect fluorescent lights, said sample being obtained by coupling a fluorescent molecule-added DNA fragment with a DNA corresponding thereto, comprising the steps of:

separating said fluorescent lights from said excitation lights, said fluorescent lights being emitted from respective multi spots or sheet-shaped irradiation locations that is obtained by irradiating said sample with multi-spot excitation lights or sheet-shaped excitation lights, said multi-spot excitation lights including a large number of M microscopic spots the diameter or the focus-achieving width of which is

smaller than 3 μm and larger than 0.3 μm, said sheet-shaped excitation lights having a width that is smaller than 3 μm and larger than 0.3 μm,

detecting said fluorescent light images emitted from said sample with use of a plurality of weak light detecting devices,

storing, individually, signals obtained from said respective detecting devices,

changing, relatively, positions of said multi-spot lights or said sheet-shaped excitation lights and a position of said sample so as to store said signals in sequence,

collecting and storing said signals over a desired range on said sample, and

constructing a fluorescent light picture from said collected data so as to inspect said DNA.

30. A DNA inspecting apparatus, comprising:

an excitation light-source,

a mechanism for holding a sample obtained by coupling a fluorescent molecule-added DNA fragment with a DNA corresponding thereto,

a multi-spot excitation lights-generating optical system for causing a light to be simultaneously generated on said sample as a plurality of M multi-spot excitation lights having a spot diameter d, said light being emitted from said light-source,

an objective lens for causing said fluorescent material to be simultaneously irradiated with

said multi-spot excitation lights in said dimension d, said fluorescent material being added to said DNA fragment on said sample,

a beam splitter for guiding obtained fluorescent lights to a fluorescent light detecting optical path through said objective lens,

fluorescent light detecting means for separating and detecting said fluorescent lights from respective multi-spot lights generated by said multi-spot excitation lights,

photon counting means including a circuit for photon-counting, individually, photon pulse signals of said fluorescent lights from said respective multi-spot lights, said fluorescent lights being obtained by said fluorescent light detecting means,

driving means for relatively changing positions of said multi-spot lights and a position of said sample so as to detect said fluorescent lights in such a manner that a desired area on said sample is irradiated with said multi-spot lights,

means for storing photon-counted information and photon-counted position information of said desired area on said sample that have been detected by said driving means and said photon counting means, and

means for determining DNA information of said to-be-inspected sample from said photon-counted information and said photon-counted position information.

31. A DNA inspecting apparatus, comprising:

an excitation light-source,

a mechanism for holding a sample obtained by coupling a fluorescent molecule-added DNA fragment with a DNA corresponding thereto,

a sheet-shaped excitation lights-generating optical system for causing a light to be generated on said sample as sheet-shaped excitation lights having a longer diameter D and a shorter diameter d, said light being emitted from said light-source,

an objective lens for causing said fluorescent material to be irradiated with said sheet-shaped excitation lights so that a shorter diameter thereof becomes equal to said dimension d, said fluorescent material being added to said DNA fragment on said sample,

a beam splitter for guiding obtained fluorescent lights to a fluorescent light detecting optical path through said objective lens,

fluorescent light detecting means for separating and detecting said fluorescent lights from sheet-shaped lights generated by said sheet-shaped excitation lights,

photon counting means including a circuit for photon-counting, individually, photon pulse signals of said fluorescent lights from said sheet-shaped lights, said fluorescent lights being obtained by said fluorescent light detecting means,

driving means for relatively changing

positions of said sheet-shaped lights and a position of said sample so as to detect said fluorescent lights in such a manner that a desired area on said sample is irradiated with said sheet-shaped lights,

means for storing photon-counted information and photon-counted position information of said desired area on said sample that have been detected by said driving means and said photon counting means, and

means for determining DNA information of said to-be-inspected sample from said photon-counted information and said photon-counted position information.

32. The DNA inspecting apparatus as claimed in Claim 30, wherein said M is equal to 10 or more.

33. The DNA inspecting apparatus as claimed in Claim 30, wherein said M is equal to 50 or more.

34. The DNA inspecting apparatus as claimed in Claim 30, comprising:

said excitation light-source,

said multi-spot excitation lights-generating optical system or said sheet-shaped excitation lights-generating optical system,

said fluorescent light detecting means, and

photon counting means, wherein said multi-spot lights or said sheet-shaped excitation lights are multi-color lights having 2 or more wavelengths.

35. A DNA inspecting apparatus, comprising:

an excitation light-source including a laser,

a mechanism for holding a sample obtained by

coupling a fluorescent molecule-added DNA fragment with a DNA corresponding thereto,

a multi-spot excitation lights-generating optical system or a sheet beam excitation lights-generating optical system where a multi-spot generating hologram or a sheet beam generating hologram is located within a resonator of said laser so as to cause multi spots or sheet beams to be generated by a strong laser light within said laser resonator,

an objective lens for causing said fluorescent material to be irradiated with said excitation lights, said fluorescent material being added to said DNA fragment on said sample,

a beam splitter for guiding obtained fluorescent lights to a fluorescent light detecting optical path through said objective lens,

fluorescent light detecting means for separating said fluorescent lights from said excitation lights so as to detect said fluorescent lights generated by said excitation lights,

driving means for relatively changing positions of said excitation lights and a position of said sample so as to detect said fluorescent lights in such a manner that a desired area on said sample is irradiated with said excitation lights,

means for storing fluorescent light-detected information and fluorescent light-detected position information of said desired area on said sample that

have been detected by said driving means and said fluorescent light detecting means, and

means for determining DNA information of said to-be-inspected sample from said fluorescent light-detected information and said fluorescent light-detected position information.